CPAAD-2/PRODUCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#21
6-17-03
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In re Application of)
David Edgar Hauber) Art Unit: 1772
Serial No. 09/332,420) Examiner: A. Chevalier
Filed: June 14, 1999)
FOR: REINFORCED THERMOPLASTIC)
PIPE MANUFACTURE)

DECLARATION UNDER 37 C.F.R. 1.132

Honorable Commissioner of
Patents and Trademarks
Washington, D.C. 20231

Sir:

I, Mounir B. Ibrahim, declare as follows:

1. I received a Ph.D. degree in mechanical engineering from Bradford University, Bradford, U.K. in 1977. My employment experience and professional credentials are annexed to this declaration on separate pages together with work projects and publications that I supervised or authored. Listed among these work projects are seven (7) projects dealing with thermoforming of thermoplastic material including a doctoral thesis supervision in the same field. A copy of United States Patent 6,368,102 in this field on which I am a co-inventor is also attached to this declaration.

2. I have reviewed this pending patent application and it is my understanding that the disclosed subject matter relates to reinforcement of one or more hollow thermoplastic pipe members with continuous fiber being thermally bonded to the outer pipe surface. In the described thermal processing procedure, the continuous fiber is applied while the one or more hollow pipe members undergo movement in a linear direction and with the fiber wrapped pipe member or members being thereafter heated sufficiently to cause thermal bonding between fiber and the outer pipe surface. Doing so successfully requires the pipe itself to retain its shape, physical dimensions and structural integrity throughout the entire procedure. It also follows therefrom that only a more limited heating rate during said processing procedure will enhance preservation of these physical characteristics in the final article. As further disclosed in the reviewed application adequate heating from the required thermal bonding can be limited to a melting action taking place at the outer pipe surface. Method claims in the originally filed

application recite the melting action as only occurring at the pipe outer surface.

3. I am also aware that the Examiner has rejected the claims in this application on the grounds that the specification fails to specifically recite certain technical features added by amendment to the now rejected claims. I further understand that under United States patent law a patent specification must describe the claimed invention in sufficient detail that one skilled in the same art can reasonably conclude that the inventor had possession of the claimed invention. I find the added limitation in the rejected claims for "the subsequent thermal bonding of applied fibers only adhering the applied fibers to the outer wall surface of the underlying pipe length without utilizing further adherence agents" to be inherently disclosed in the originally filed specification and claims. My opinion pertaining to non-use of adherence agents is based upon finding no mention of these agents in the filed application as well as finding multiple recitations in the filed specification and claims to such specific fiber orientation in the final article. I find the further added limitation in the rejected claims for "while not further melting said underlying pipe length to avoid thermally induced residual stress therein" to similarly be inherently disclosed in the originally filed specification. In support of the latter opinion, one having skill in the general art of thermally processing already existing thermoplastic articles as well as the more specific art of reinforcing hollow thermoplastic articles with thermally bonded fiber already understands the nature of thermoplastic material upon being heated. Said skilled artisan is well aware that residual stress in a thermoplastic material occurs from an excessive heating rate. It would be readily apparent to said skilled artisan that limiting the melting action upon thermoplastic material in the final article being formed to the outer surface of the underlying pipe will result in a lesser residual stress condition.

4. With the above considerations in mind and based upon my review of the originally filed application light of my own extensive experience in the thermoforming of thermoplastic material as well as various articles formed with said material, it is my opinion that all newly added claim

recitals in the reviewed application are adequately supported in the originally filed application through express, implicit or inherent disclosures. In other words, I believe that a skilled person in this art would clearly recognize that the present inventor was in possession of the now claimed invention at the time of filing the original application.

5. Having also reviewed the Gibson et al reference (H1261) upon which the presently amended claims have been further rejected, I am of the further opinion that the method of preparation employed therein involves considerably more heating of the final article than occurs in forming the now claimed final article. It is well recognized that an excessive heating rate of a thermoplastic material causes thermal degradation and residual stress in the final article. Since Gibson et al maintains all thermoplastic material in a thixotropic molten state during the entire winding process it can be expected that such undesirable conditions exist to some degree in the final article. A far lesser heating rate is employed to form the now claimed final product as depicted in the drawings of the pending application. As therein depicted, the fiber reinforcement is conduct with continuous linear movement of the underlying thermoplastic pipe members(s) while limited heating of the outer pipe surface thermally bonds the already applied fiber thereto. It is my opinion, that the Gibson et al reference does not make the now claimed final article to be simply obvious therefrom.

6. The heating requirement in this reference for the final article to be entirely formed on a heated mandrel is viewed to further lead away from the now claimed invention. Heat is applied with said underlying heated mandrel concurrently with heat being supplied from a second source to the external surface of the wound filament. Heating in such dual manner is said to maintain all thermoplastic material in the composite article in a molten state during the forming procedure. In my opinion, a requirement to subject the article being formed to this degree of heating can certainly impart residual thermally induced stress in the resulting article along with a potential for greater thermal degradation of the thermoplastic material in said article.

7. The undersigned declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to

be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the pending application or any patents issuing thereon.

Respectfully submitted,

Mounir B. Ibrahim

May 1, 2003

- Thermal Energy Storage Systems:
  3-D Modeling of Transient Heat Transfer (Conduction, Convection & Radiation) in Thermal Energy Storage Canisters

III. EMPLOYMENT

3/98 – present	Cleveland State University, Cleveland, Ohio, Chair, M.E. Department
1/94 - present	Cleveland State University, Cleveland, Ohio, Professor
9/85 - 1/94	Cleveland State University, Cleveland, Ohio, Associate Professor
8/84-9/85	Michigan Technological University, Houghton, Michigan, Assistant Professor
8/83 - 8/84	Iowa State University, Ames, Iowa, Visiting Assistant Professor (On leave from UPM)
10/78 - 8/83	University of Petroleum & Minerals, Dhahran, Saudi Arabia, Assistant Professor
2/77 - 10/78	Bradford University, Bradford, United Kingdom, Post Doctoral Research Assistant
1/74 - 2/77	Bradford University; Bradford, United Kingdom, Postgraduate Student
9/73 - 12/73	Technical University of Denmark, Laboratory for Energetics, Visiting Research Fellow
12/68 - 9/73	Cairo University, Cairo, Egypt, Demonstrator

IV. COMPLETED PROFESSIONAL DEVELOPMENT COURSES

1997 "ALGOR" Finite Element Software for Engineering Systems, Cleveland, Ohio, ALGOR, Inc.
1995 "Combustor Modifications for Low Emissions" ASME Course, IGTI, Houston, Texas.
1991 "PATRAN" and "FLOTRAN - Computationally Efficient Finite Element Software for Fluid Flow and Heat Transfer Problems", NASA Lewis Research Center, Cleveland, Ohio.
1990 "FIDAP" Fluid Dynamics International, Evanston, Illinois.
1985 "Computational Fluid Flow and Heat Transfer" ASME Course, National Heat Transfer Conference, Denver, Colorado.
1984 "Two-Phase Fluid Flow and Heat Transfer", Iowa State University, Ames, Iowa.
1978 "Theoretical and Experimental Analysis of Turbulent Fluid Flow and Heat Transfer" Imperial College - London, United Kingdom.
1974 "Numerical Analysis and Computer Science", Bradford University; Bradford, United Kingdom.
1968- 1972 Completed Postgraduate Courses in Computer Programming (Fortran IV), Thermodynamics, High Mathematics, and Combustion., Cairo University; Cairo, Egypt.

V. RESEARCH PROPOSALS AND GRANTS

V.I. RESEARCH ACTIVITIES WITH INDUSTRY

Dr. Ibrahim has been instrumental in conducting research activities with local and regional industry. The total amount of research funding is about $800,000 over the past 8 years. Below is a brief description of each project title, funding source, funding amount and project duration:

1) Project Title: " Analysis of Using Gas/Electric Heaters in the Secondary Thermodynamics of Plastic
Material"
Funding Source: CSU-AMC
Funding Amount: $16,000
Project Duration: November 1993 – June 1996

2) Project Title: " Gas Heating Development in the Secondary Thermoforming of Plastic Material"
Funding Source: CAMP, Inc.
Funding Amount: $25,000
Project Duration: July 1994 – June 1995

3) Project Title: "Comparative Study of Gas VS Electric Heaters in Thermoforming Applications"
Funding Source: Gas Research Institute, CAMP Inc., and East Ohio Gas
Funding Amount: $347,724
Project Duration: September 1997 – December 1998

4) Project Title: " Investigation of Thermoforming Two Polypropylene Resins (α & β) Using Large and Small Molds"
Funding Source: Aristech Chemical Corp. Research Laboratory
Funding Amount: $4,800
Project Duration: August 1998

5) Project Title: "Development of a High Turndown Gas-Fired Infrared Burner for Thermoforming Applications"
Funding Source: Gas Research Institute, CAMP Inc., and CNG
Funding Amount: $350,000
Project Duration: October 1999 – September 2001

6) Project Title: " Investigation of the Thermal Cycle in the Production of Foam Patterns for Lost Foam Casting Process"
Funding Source: CAMP, Inc.
Funding Amount: $29,500
Project Duration: July 1995 – June 1996

7) Project Title: " Corrosion Test"
Funding Source: IAS
Funding Amount: $5,000
Project Duration: November 1995 – February 1996

8) Project Title: " Thermal Conductivity of Thin Plastic Sheets"
Funding Source: OSS
Funding Amount: $3,400
Project Duration: November 1996 – February 1997

9) Project Title: "Infrared Consolidation Study No. 1"
Funding Source: Pentair Water Treatment
Funding Amount: $9,500
Project Duration: July 2001 – August 2001

10) Project Title: "A Study of the Cooling System for SL192 Hatchers"
Funding Source: Chickmaster Incubator Co.
Funding Amount: $3,900
Project Duration: August 2001 – November 2001

9) Project Title: "Improving Performance of the Stirling Converter: Redesign of the Regenerator with Experiments, Computation and Modern Fabrication Techniques"
Funding Source: U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy
Funding Amount: $540,966
Project Duration: September 2000 through August 2003
[This research is collaboration among CSU, University of Minnesota, and Gedeon Associates and NASA Glenn Research Center.]

10) Project Title: "Validation of Multi-Dimensional Stirling Engine Codes"
Funding Source: NASA Glenn Research Center
Funding Amount: $100,000
Project Duration: March 2001 through August 2001
[This research is collaboration among CSU, University of Minnesota, and Gedeon Associates.]

11) Project Title: "MEMS Stirling Cooler: Modeling and Analysis"
Funding Source: NASA Glenn Research Center
Funding Amount: $18,020
Project Duration: March 2001 through August 2001
[This research is collaboration between CSU and Gedeon Associates.]

V. THESIS SUPERVISION

DOCTORAL

1. "Optimum Load Matching in Direct-Coupling Photovaltaic Systems" Kamel Y. Khouzam, Doctoral Dissertation, CSU, August 1989. (Member of the Doctoral Committee).

2. "Transient Thermal Analysis of A Brayton Cycle Solar Dynamic Heat Receiver" Kyung Ahn, **Doctoral Dissertation**, CSU, August 1990. **(Chairman of Doctoral Committee).**

3. "Computational Heat Transfer Modeling of Thermal Energy Storage Canisters" Pavel Sokolov **Doctoral Dissertation**, CSU, August 1997. **(Chairman of Doctoral Committee).**

3. "Computational And Experimental Investigation of A Multi-Mode Heat Transfer In an Electric Infrared Oven" Tanios Bougebrayel **Doctoral Dissertation**, CSU, May 2000. **(Chairman of Doctoral Committee).**

5. "Computational Fluid Dynamics And Heat Transfer Modeling of Stirling Engine Type Cylinders" Roy Tew **Doctoral Dissertation**, CSU, November 2000. **(Chairman of Doctoral Committee).**

6. "Computational And Experimental Investigation of Premixed Combustion In Porous Ceramic Infrared Heaters " Yongwei Luan **Doctoral Dissertation**, CSU, In progress. **(Chairman of Doctoral Committee).**

7. Zhiguo Zhang, Doctoral Dissertation, CSU, In progress. **(Chairman of the Doctoral Dissertation Committee).**

8. Joseph Doraski, Doctoral Dissertation, CSU, In progress. **(Chairman of the Doctoral Dissertation Committee).**